A SMALL PORTABLE LIGHT TRAP FOR COLLECTING MICROLEPIDOPTERA

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Abstract

A small portable, transparent light trap, using a 6 watt actinic light source operated by a 12 volt battery, is described and figured. The trap segregates in separate compartments larger fast-flying from small slow-flying insects and has proved to be especially useful for the collection of microlepidoptera.

Introduction

Light traps are widely used for the collection of insects, especially to monitor pest populations, but also for insect surveys and to provide museum specimens. Whatever their use, the trapped specimens should be in good condition to aid identification, and this is essential when traps are to provide specimens for taxonomic study. Lepidoptera are especially vulnerable to damage when large numbers of beetles and other hard-bodied insects are collected with the moths in a small container. Microlepidoptera can often be denuded when they share a light-trap container with large fast-flying Lepidoptera. During the warmer months in Australia christmas beetles (*Anoplognathus* spp.; Scarabaeidae), as well as bogong moths [*Agrotis infusa* (Boisd.)] and other noctuid moths, are often attracted to lights in large numbers and can rapidly destroy small soft-bodied insects with which they come in contact before they themselves succumb to the killing agent used in the trap.

In order to lessen this problem, a transparent light trap was designed (Common 1959) using a 125 watt mercury vapour discharge lamp operated by a 240 volt generator or the mains supply. This excluded most of the larger scarab beetles and segregated the few that did enter the trap from most of the Lepidoptera. The principles of this design were later adapted for a fixed weather-resistant light trap (Common and Upton 1964), which performed well throughout the year at Canberra, Australian Capital Territory, for a period of some 15 years. For use in field work, however, especially in situations in which it is impracticable to operate a generator, a small transparent trap has been designed, utilizing a 6 watt actinic blue fluorescent tube. This trap has now been in use for a number of years and has proved to be very efficient for the collection of microlepidoptera in most habitats.

I have observed consistently that fast-flying moths tend to circle a light source and, when they come into contact with the lamp or the sides of a trap funnel, fall into the trap. Slow-flying moths, on the other hand, and especially microlepidoptera, tend to approach a light source up-wind close to the ground. They often land on the ground or on low-growing vegetation, intermittently walking or fluttering towards the light and sometimes remaining motionless for a time on vegetation or leaf litter. In designing the new trap, therefore, these behaviour patterns have been exploited to segregate as far as

possible the fast-flying larger moths from the slow-flying microlepidoptera, and to exclude scarab beetles. It had already been shown (Common 1959) that a transparent trap collected far fewer Scarabaeidae than an opaque trap; those scarabs that approached the light source tended to land on the ground in the illuminated area surrounding the transparent trap and either became immobile or crawled around beside the trap without entering it.

Description of the trap

The trap (Figs 1-3) is constructed of clear "Perspex" 3 mm in thickness and is in the form of a rectangular box (I) 236 mm long, 152 mm wide and 154 mm high, open at the top with the edges bevelled inwards, and with a line of 3 mm drainage holes drilled in the middle of the bottom. In each of the four sides, 22 mm from the top, there is an elongate slot (H) 5 mm wide and extending to within 20 mm of each corner. Above each slot a ledge (G), which projects 8 mm, diverts into the trap insects that crawl upwards and also prevents rain entering the slots. In a compartment (L) divided off by "Perspex" at one end of the trap, the converter from a 6 watt, 12 volt battery lantern is installed and wired to an inlet and outlet on the outside of the trap. In the remainder of the bottom of the trap sits a rectangular tray (K) with 12 mm sides and two 12 mm walls that divide off a central elongate section 25 mm wide; a series of drainage holes drilled through the middle of this section match those in the bottom of the trap. About 72 mm above the bottom a second rectangular tray (J) with 25 mm sides sits on two strips glued to

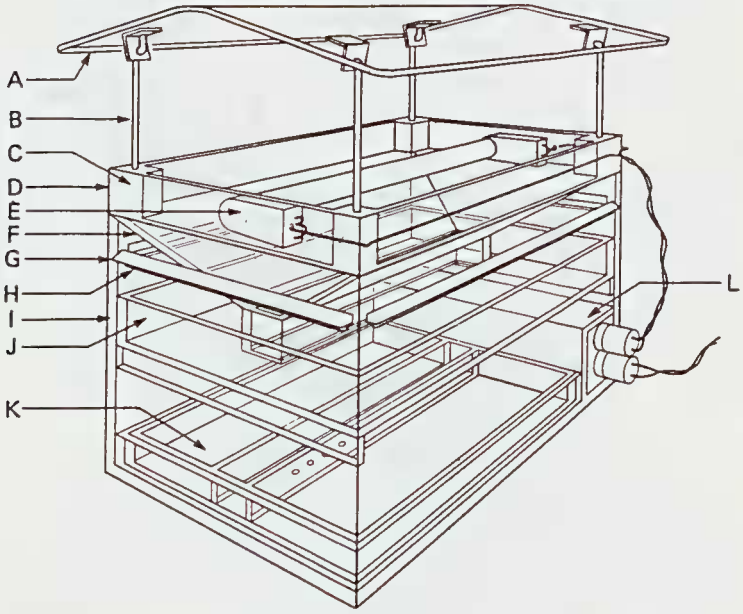

Fig. 1. The assembled portable light trap

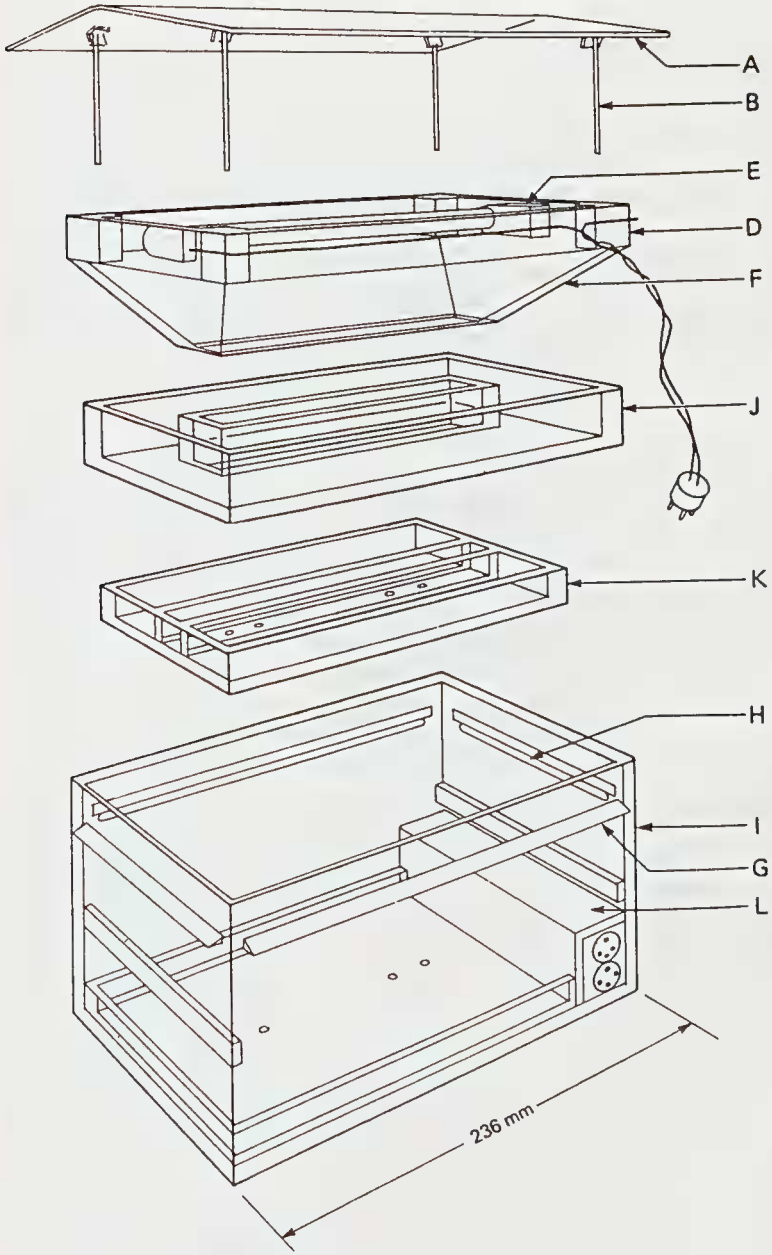

Fig. 2. An exploded view of the trap components.

each end of the trap. In the centre of this tray there is a slot 170 mm long and 17 mm wide, surrounded by 25 mm sides. A funnel (F) with the same outside dimensions as the body of the trap sits on the top. This is rectangular with 25 mm vertical sides (D) above, which continue below at an angle of 52° to the vertical to an opening 170 mm long and 17 mm wide that rests accurately on the edges of the central slot in the upper tray. On the inner surface of each of the vertical ends of the funnel the holders (E) for the horizontal 6 watt actinic blue tube are fitted, with wiring leading to the power outlet from the converter. In each corner of the funnel a 16 mm square "Perspex" block (C), with a 3.5 mm vertical hole drilled in its centre, is glued. A transparent, slightly bent rectangular cover (A), 205 mm by 280 mm, has four folding wire legs (B) 110 mm long which fit into the holes at the corners of the funnel. The cover is placed in position only if rain threatens.

Discussion

The trap is operated on the ground so that the light source is visible from above and the surrounding area is illuminated. A small area of soil, slightly larger than the base of the trap, is cleared of vegetation and levelled, and the trap is either placed firmly on the loosened soil so that insects cannot crawl beneath it, or placed on a thin piece of particle board or cardboard. Ants are sometimes a problem, but I have found that they can be discouraged by spraying the soil beneath the trap and the lower side of the particle board with a household spray before setting up the trap.

Tetrachloroethane is used as an anaesthetic or killing agent in the trap. This is dispensed from three shallow aluminium dishes about 45 mm in diameter. In each there is a 7 mm layer of vermiculite covered by a 7 mm layer of plaster of Paris, through which there is a central hole stoppered by a cork. Each dish is charged with about a millilitre of tetrachloroethane by an eyedropper through the hole in the plaster, although more may be necessary during warm weather. Two plaster dishes on the upper tray of the trap and one on the lower have proved adequate. It should be remembered that tetrachloroethane is a solvent of "Perspex" and a dish can inadvertently be glued to the plastic if any solvent is left on the outside of the dish.

The trap is operated with a 12 volt acid motor-cycle battery or a 12 volt nickel-cadmium rechargeable battery, either of which will give more than 10 hours of continuous light. However, in warmer weather when insects are abundant, it is often desirable to limit the operating time with a time switch. This also allows the trap to be operated for any desired period during the night.

Fast-flying moths and other insects that tend to circle the light enter the trap through the funnel at the top and are directed to the lower storey of the trap. Slow-flying moths that crawl up the sides of the trap enter it through the slots near the top and are immobilized on the upper tray. The 5 mm wide slots normally prevent the entry of bogong moths and larger species. The removable upper and lower trays allow the catch to be sorted next morning without undue disturbance to the specimens collected.

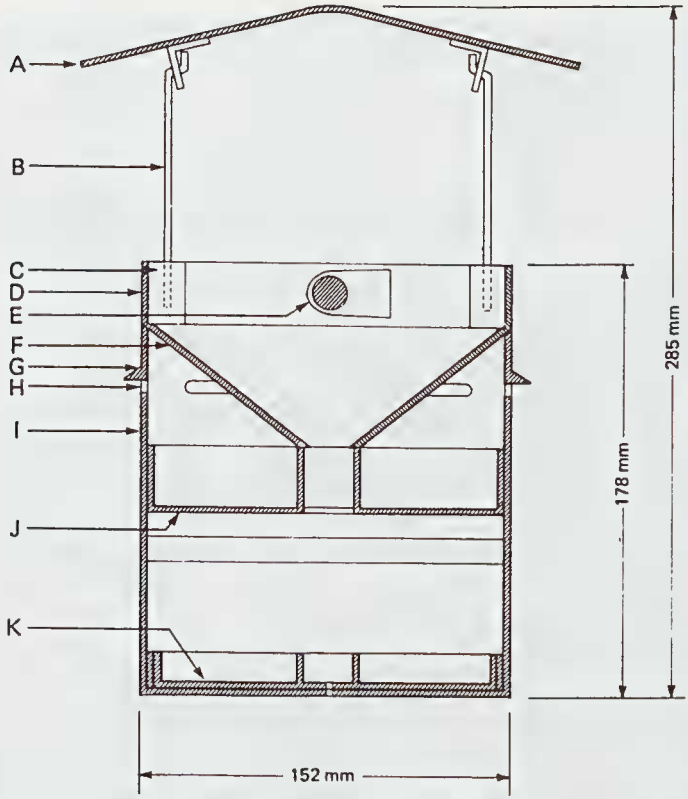

Fig. 3. A vertical section through the light trap.

The low wattage actinic blue tube is very attractive to moths and other insects but, since the light is not reflected to any extent by surrounding trees and other objects, the trap is not noticeable to humans unless the light is in their direct line of vision. This makes it very useful for sampling habitats close to busy thoroughfares and human settlements. However, care should be taken to select a position for the trap screened in some way from view. The compact design and the light weight of the trap also make it useful for collecting in habitats that are not accessible to vehicles.

Acknowledgement

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References

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